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Are Quantity and Pitch Contour Independent Distinctive Features in Bosnian Serbian?

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Introductory Remarks

- Previous studies: Serbo-Croatian
- Few grammatical differences between Serbian and Croatian, from a linguistic point of view dialects rather than languages
- Languages share accent system
- In Bosnia-Herzegovina three official languages: Serbian, Croatian and Bosnian
- This study: Bosnian Serbian

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Overview

- The Accent System of Bosnian Serbian
- Perception Experiment
- Conclusions

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The Bosnian Accent System

- Shape of pitch accent meaning distinctive = Pitch Accent language
- Accents not represented in orthography
- Traditional descriptive grammars (starting in the 19th century) distinguish four accents on syllables carrying lexical stress
- short falling \
- short rising /
- long falling \:
- long rising /:
- quantity and accent shape appear independent distinctive features

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The Accent Distribution

	1st syll	2nd syll	3rd syll	4th syll	5th syll
mono-syllabic	\,\:				
bi-syllabic	\,\,/, /:				
three-syllabic	\,\,/, /:	/, /:			
four-syllabic	\,\,/, /:	/, /:	/, /:		
five-syllabic	\,\,/, /:	/, /:	/, /:	/, /:	

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The Accent Distribution

- Monosyllabic words: only falling accents
- Polysyllabic words:
  - All accent types on first syllable
  - Only rising accents on other syllables
  - Accent location anywhere except ultimate
- Quantity contrasts are very frequent, since they may appear almost anywhere
- Rising vs. Falling contrast occurs only on first syllable in polysyllabic words

➢ **Hypothesis: Quantity should be the more stable contrast**

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Some phonetic facts... (Lehiste and Ivic, 1963-1986)

- Falling accents:
  - Peak in middle of accented syllable
  - Higher peaks
  - Short falling: no consistent fall after peak, but low following syllable
  - Long falling: steep fall after peak
- Rising accents
  - Short: peak in accented syllable, usually lower
  - Long: peak at the end of accented or in following syllable
  - Higher following syllable
- Tonal contrasts on short accents very similar
- "tonal contrasts are about to lose distinctiveness" (Lehiste 1961)

➢ **Hypothesis: Listeners have problems distinguishing (short) falling/rising**

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Utterance-Accent Interaction...

- Contrasts between falling and rising tones can be neutralised by phrasal tones
- Quantity contrasts keep stable in an utterance environment (Purcell 1973)

➢ **Hypothesis: Listeners have problems distinguishing falling/rising**

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Conclusions

- True tonal contrasts occur in few environments
- Tonal contrasts are phonetically subtle and can be neutralised by utterance intonation
- Quantity contrasts are frequent and resistant against neutralisation
- Tonal contrasts are about to loose their meaning distinctive function
- Maybe, the phonological system of Bosnian Serbian nowadays distinguishes only two tones (long vs. short) with allophonic tonal variations. Tonal variation alone is not meaning distinctive (Brozovic and Ivic 1988)

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The Perception Experiment: Hypotheses

- Quantity contrasts most robust – minimal pairs should be clearly identifyable
- Minimal pairs with a quantity plus tonal contrast should be clearly distinguished
- Tonal contrast less robust:
    - minimal pairs should be difficult to distinguish or
    - minimal pairs have become homonymns
- Short tones should be most difficult to identify

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The Perception Experiment: Data Preparation

- List of 78 prosodic minimal pairs
- 40 native speakers evaluated the list and determined reliable minimal pairs
    - Unfamiliar words were excluded
    - Highly infrequent words were excluded
- Evaluators did not participate in perception study
- Final list consists of 34 minimal pairs
    - 13 tonal minimal pairs (6 short, 7 long)
    - 12 quantitative minimal pairs (4 rising, 8 falling)
    - 9 complex minimal pairs (6 short rise/long fall; 3 short fall/long rise)

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The Perception Experiment: Examples

Quality contrasts	short	
	falling: para (steam)	rising: para (money)
	long	
	falling: mlada (bride)	rising: mlada (young woman)
Quantity contrasts	rising	
	short: zavesti (to seduce)	long: zavesti (to stitch)
	falling	
	short: pas (dog)	long: pas (belt)
Complex contrasts	short fall: vila (mansion)	long rise: vila (fairy)
	short rise: desna (right, ADV)	long fall: desna (gums)

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The Perception Experiment: Data recording

- List read and recorded by a male native speaker, 56 years, German resident
- Speaker was provided with orthographic list plus German translation, since accents are not marked in orthography
- Speaker read words in isolation
- Recordings were checked during production for correct pronunciation

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The Perception Experiment: Listener Groups

- Listener Group 1: Long term residents in Germany (> 10 years) with good to near native German skills, several bilingual speakers (n=12)
- Listener Group 2: Residents of Bosnia without foreign language skills (n=6)

➢ Since German is not a pitch accent language but has phonological quantity, Listener Group 1 might have even more difficulties with tonal contrasts.

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The Perception Experiment: The Task

- Listening to audio-files via headphones
- Listeners were allowed to listen to each file several times
- Listeners instructed to type either the German translation or a typical example sentence with the word listened to
- Listeners were informed that the words could be proper names, nouns, adverbs, adjectives, verbs and be inflected
- Listeners were informed that the list contained 68 words
- Listeners were informed that words may but do not have to occur twice to exclude any bias against repetetive answers
- Listeners were not given any other help or information
- For each listener, it was written down whether (s)he hesitated or needed several repetitions to get to an answer

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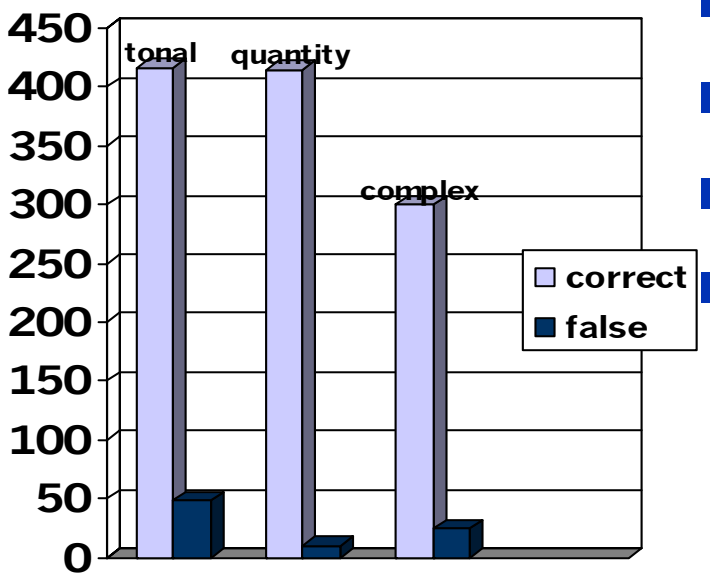
The Perception Experiment: Results

- 11 times, listeners claimed not to know/understand a word
- 1213 judgements
- 82 errors, overall error rate: 7.25%
- tonal contrasts: 464 judgements, 48 errors: 10.34%
- quantity contrasts: 425 judgements, 10 errors: 2.35%
- complex contrasts: 324 judgements, 24 errors: 7.4%



➢ tonal contrasts less reliable (hypothesis confirmed), but still identifyable in the vast majority of cases (hypothesis rejected)

➢ quantity contrasts very well identifiable (hypothesis confirmed)

➢ tone/quantity interaction reduces identifiability rather than enhances it (hypothesis rejected)

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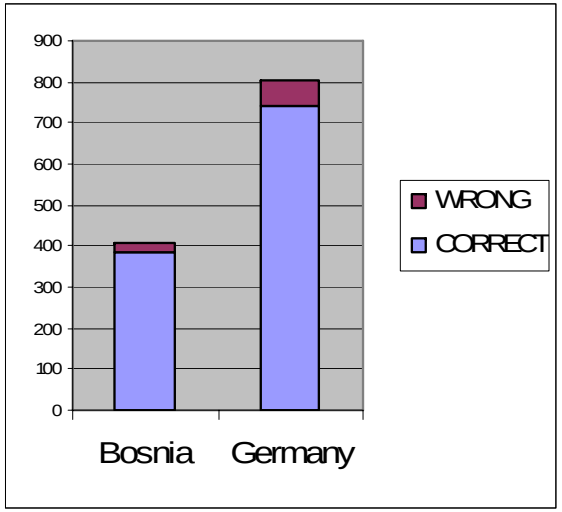
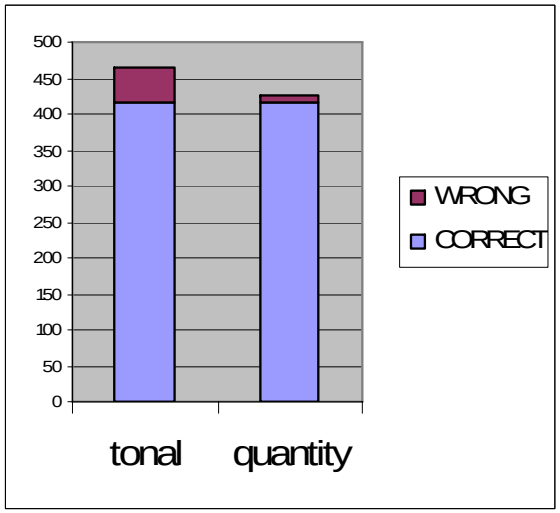
The Perception Experiment: Results

- listeners made significantly less mistakes in quantity contrasts (χ^2, $p<0.001$)
- no significant differences between tonal contrast and complex tonal/quantity contrasts
- listeners living in Bosnia perform better in all categories, but differences are not significant





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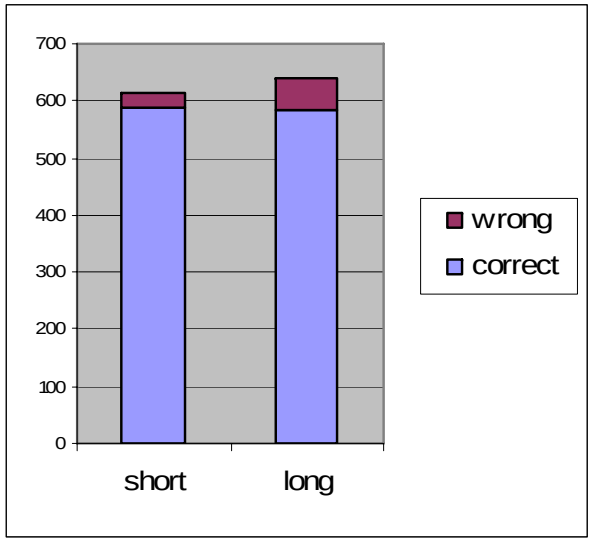
The Perception Experiment: Results

- listeners had not more problems to identify short accents
- short accents even show less errors (χ^2, $p<0.05$)



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The Perception Experiment: Conclusions

- Listeners can identify contrasts involving tones, but are less confident/secure, probably due to the fact theat they are less reliable and can often be neutralised
- Lack of reliability of tonal contrasts even decreases performance if additional quantity contrasts are present
- Tonal contrasts are still present in contemporary Bosnian Serbian and can be identified by listeners living in and out of the country
- No clear evidence that short accents more difficult to identify

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Conclusion

- Tones and duration are independent phonological features in Bosnian Serbian
- Tonal contrasts are less reliable because they are often neutralised and thus listeners are prone to error if a tonal contrast is present